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NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/2
NATIONAL DAM SAFETY PROGRAM. YANKEE LAKE DAM (NY 332), DELAWARE--ETC(U)
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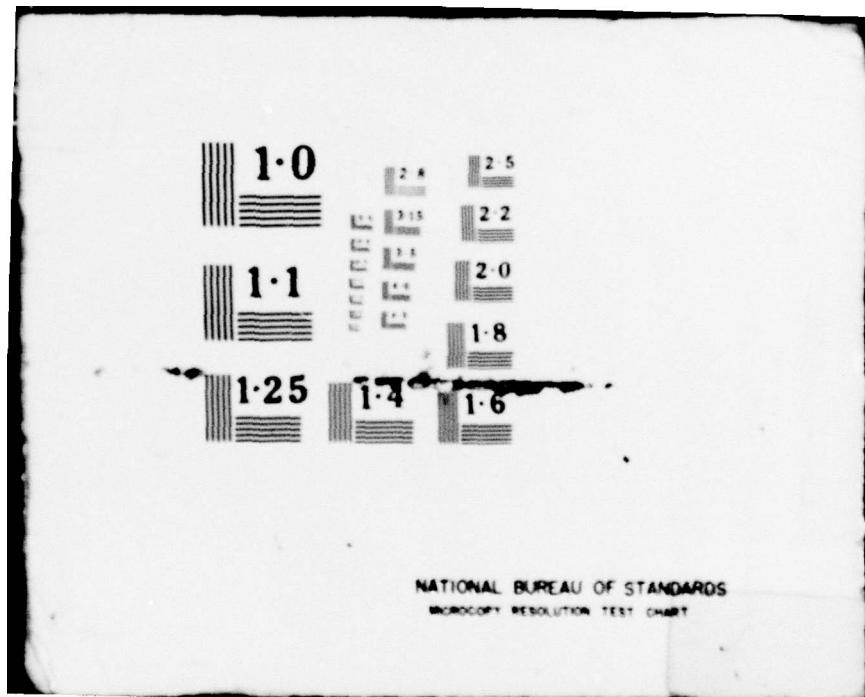
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| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization. Yankee Lake Dam did not reveal any conditions which pose an immediate threat to life or property. However, a seepage problem at the toe of the dam must be corrected. Additionally, monitoring of settlement (currently inactive) and removal of vegetation were recommended. | | |

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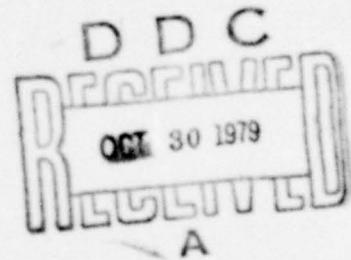
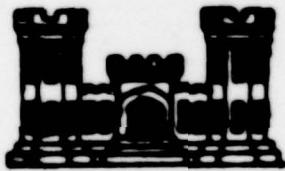
DELAWARE RIVER BASIN

YANKEE LAKE DAM

**SULLIVAN COUNTY, NEW YORK
INVENTORY No. NY 332**

AD A075687

**PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**



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NEW YORK DISTRICT CORPS OF ENGINEERS

APRIL , 1979

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probably Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
YANKEE LAKE DAM I.D. No. NY 332
DEC #163D-168 DELAWARE RIVER BASIN
SULLIVAN COUNTY

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PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam: Yankee Lake Dam (I.D. No. NY 332)
State Located: New York
County Located: Sullivan
Stream: Pine Kill (a tributary of the Basher Kill and Neversink River)
Dates of Inspection: October 20 and 24, 1978

ASSESSMENT

The examination of documents and the visual inspection of Yankee Lake Dam and appurtenant structures did not reveal conditions which constitute an immediate hazard to human life or property. The dam however, has a number of problem areas which if not remedied, may have the potential for developing into hazardous conditions.

The primary problem area is the observed seepage which appeared at the toe of the dam in the vicinity of the spillway. This seepage is estimated to be 100 to 125 gallons per minute; the source of which is believed to be seepage paths in the vicinity of the masonry spillway walls and the adjacent earth embankment cores. An immediate investigation of these areas is required to ascertain the type and extent of remedial measures required to control the seepage. A grouting program was in progress May 2, 1979 to eliminate the seepage paths on both sides of the spillway. If this program is unsuccessful, an engineering investigation and additional remedial measures will be required to control this seepage. All lake drainage facilities must remain completely open until such time as successful remedial measures are instituted.

The following deficiencies were observed and require remedial attention during this construction season:

1. Periodically and systematically monitor the conditions of observed settlement and movement (which are believed to be currently inactive) in the vicinity of the spillway and on the downstream face. Develop a contingency plan for evacuation of downstream residents and notification of the proper authorities if movement or other hazardous conditions develop.
2. Remove the vegetation observed along the toe of the dam and provide a periodic program of mowing and cutting.
3. Initiate a program of periodic inspection and maintenance of the dam and appurtenances. Document this information for future reference and develop an operations manual.

The storage capacity of the reservoir is adequate to retain the Probable Maximum Flood (PMF) with no discharge.

George Koch

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Clark H. Benn

Col. Clark H. Benn
New York District Engineer

Approved By:

Date:

10 July 79

Photograph #1

Overview of Yankee Lake Dam



PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
YANKEE LAKE DAM I.D. No. NY 332
DEC #163D-168 DELAWARE RIVER BASIN
SULLIVAN COUNTY

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase 1 inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

Evaluation of the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to human life and property and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenant Structures

The Yankee Lake Dam consists of a 1600 feet long earth embankment containing a 3 feet wide concrete lined masonry walled spillway located near the center of the dam. The dam is 22 feet high having a nearly vertical downstream face and an upstream slope of 2 vertical on 1 horizontal, both constructed of masonry. The crest of the embankment is 30 feet wide except in the vicinity of the spillway where it is 34 feet wide. No drawings concerning the design of the dam were available. However, the dam was constructed in a manner similar to that of Wanaksink Lake Dam I.D. No. NY 330, the design of which included 6 feet thick masonry walls placed adjacent to an embankment core of "Selected Material". The ungated spillway is constructed of recently placed concrete. The original spillway walls are composed of masonry blocks. The spillway crest is 9.6 feet lower than the crest of the dam. Flow through the spillway is controlled by stoplogs, 2 of which were in place at the time of inspection. An 18 inch diameter steel pipe is located directly beneath the spillway, and the flow through this pipe is also controlled by the same stoplogs. A 12 inch diameter steel pipe located at the base of the dam below the spillway, serves as a reservoir drain. The flow is controlled by a manually operated gate valve, the controls of which are located in the gate house above the spillway.

b. Location

The Yankee Lake Dam is located on the Pine Kill, a tributary of the Basher Kill and the Neversink River. The dam is situated within the Town of Mamakating, Sullivan County.

c. Size Classification

The dam is 22 feet high and has an impoundment capacity of 2700 acre-feet. Since the impoundment capacity is in excess of 1,000 acre-feet, the dam is classified as "intermediate" in size.

d. Hazard Classification

The dam is classified as "high" hazard because of numerous homes located within 1,000 feet of the dam. Additional homes are also present along the Pine Kill.

e. Ownership

The dam is owned and operated by the Yankee Lake Company Box 225, RR #1, Wurtsboro, NY 12790. Anthony J. Spina (President), J. David Schardien (Sec/Tres), Tel: (201) 687-0111, Richard Jewett (Caretaker) Tel: (717) 491-4635, and Donald Patterson (past President), Tel: (914) 754-8635.

f. Purpose of the Dam

The original purpose of the dam was water supply for the Delaware and Hudson Canal. Currently, it provides recreational facilities for the property owners surrounding Yankee Lake.

g. Design and Construction History

The dam and its appurtenant structures were designed and built by the Delaware and Hudson Canal Company about 1844. The earth core of the dam was excavated and backfilled with more impervious material near the south side of the spillway in 1924 and 1964. This rehabilitation was initiated to control seepage along the south spillway wall. About 1967, a concrete spillway was poured within the masonry walls to reduce seepage potential in the spillway channel. In 1978, concrete spillway walls 2 feet high and approximately 4 inches thick were constructed adjacent to the masonry spillway walls to further reduce seepage potential. Grouting of the masonry spillway walls is proposed during this construction season to control the observed seepage reported herein.

h. Normal Operating Procedures

Water flows over the ungated spillway; the rate of which depends upon the lake level.

1.3 PERTINENT DATA

| | |
|---|---------|
| a. <u>Drainage Area (sq. mi)</u> | 3.5 |
| Height of dam (feet) | 22 |
| b. <u>Discharge at Dam Site (cfs)</u> | |
| Maximum known Flood | Unknown |
| Spillway at Maximum Pool (El.1447.8) | 400 |
| Maximum Capacity of reservoir drain and spillway augmentation pipe | 50 |
| Total Discharge, Max. Pool | 450 |
| Average Daily Discharge | Unknown |
| c. <u>Elevation (ft. above MSL-Datum)</u> | |
| Top of Dam | 1,447.8 |
| Spillway Crest | 1,438.0 |
| Tailrace Channel | 1,425.0 |
| Invert Reservoir Drain Outlet | 1,426.0 |
| d. <u>Reservoir</u> | |
| Length of maximum Pool, miles | 2.4 |
| Length of Shoreline (Spillway Crest) miles | 4.6 |
| Surface area (Spillway Crest) acres | 0.6 |
| e. <u>Storage, (Acre-feet)</u> | |
| Spillway Crest | 2,700 |
| Top of Dam | 7,000 |

f. Dam
Embankment
Type: Earth with stone face walls
Length (ft.) 1,600
Upstream slope 2 vertical to 1 horizontal
Downstream slope Vertical
Impervious Core None

Crest Elevation, ft. 1,447.8
Crest Width, ft. 26
Grout curtain None

g. Spillway
Type: Rectangular Channel
Length, ft. 3.6
Crest Elevation MSL 1,438.0
Upstream Channel Not visible
Downstream Channel-Shallow and full of debris
and rock outcrop.

h. Regulating Outlet None

i. Reservoir Drain: 12" diameter reservoir drain
is operational (manually operated
gate valve)

j. Spillway Augmentation Pipe
18" pipe is operational

SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Geology

The Yankee Lake Dam is located in the "Appalachian Uplands" physiographic province of New York State. This province (the northern extreme of the Appalachian Plateau) was formed by dissection of the uplifted but flat lying sandstones and shales of the Middle and Upper Devonian Catskill Delta. Relief is high to moderate. Maximum dissection occurs in the Catskill Mountain area, where only the mountain peaks approximate the original plateau surface. Drainage is generally southwest toward the Delaware River system.

b. Subsurface investigations

The "General Soil Map of New York State" prepared by Cornell University Agriculture Experiment Station indicates that the surficial soils are Lackawanna soils of glacial till origin. These soils are generally stony sand silt and gravel with a trace of clay, having poor internal drainage characteristics. Boulders are also common in these soils; depth to bedrock is variable.

c. Embankment and Appurtenant Structures

The dam was designed and built by the Delaware and Hudson Canal Company about 1844. No drawings could be located. However, a sketch of the spillway has been included in Appendix F. The spillway area was reconstructed in 1964, 1967, 1978 and a grouting program is scheduled for the spillway walls this year. The embankment was constructed of impervious type material with the upstream and downstream faces and the spillway walls formed of sandstone block masonry construction.

2.2 CONSTRUCTION RECORDS

No construction records are available.

2.3 OPERATION RECORDS

No maintenance or operation record or manual is available.

2.4 EVALUATION OF DATA

Some of the data presented in this report has been made available by Mr. Donald Patterson and Mr. Richard Jewett of the Yankee Lake Company. This information has been invaluable in the preparation of this report, and appears adequate and reliable for Phase 1 Inspection purposes.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

Visual inspection of the Yankee Lake Dam and the surrounding watershed was conducted on October 20 and 24, 1978. The weather was partly cloudy and the temperature ranged in the forties. The lake level was 12 feet 2 inches below the top of the dam at the time of inspection.

b. Embankment and Abutments

The embankment exhibits some settlement particularly in the vicinity of the spillway. (See Photographs #1, 2, 4 & 5). The embankment, within 20' of each side of the spillway, appears to have settled differentially from the spillway. The settlement was reported not to be of a recent nature, and could be attributed to long term settlement of the embankment portions of the dam, and/or loss of embankment material from previous seepage problems. The masonry blocks, which form the upstream and downstream faces of the dam, are tipped substantially near the spillway walls. Settlement of the embankment sections along the downstream edge of the crest is estimated to be 10 to 12 inches on the north side of the spillway and about 8 inches on the south side of the spillway. (See photograph #2). Settlement was also observed along the upstream edge of the crest on either side of the spillway. The settlement is most pronounced on the north side, measuring a maximum of 14 inches. Mr. Jewett stated that this settlement has been present since at least the mid 1950's when he took charge of maintenance. No settlement was observed at a distance greater than 20 feet in either direction from the spillway. (See photographs #1, 4 & 5). A slight bulge was observed in the downstream face approximately 200 feet north of the spillway. (See photographs # 8 & 9). The bulge was approximately 25 feet in width and extended about 6 inches outward. No seepage was observed exiting from the face of the dam. The surface soil below the toe of the dam was soft and some standing water was observed. This is probable related to precipitation which occurred the previous night. No toe drainage or other internal drainage system was incorporated in the construction of the dam. Considerable tree growth was observed at the toe of the dam.

c. Spillway

The spillway is a 3 feet wide concrete lined sluiceway having a crest 9.6 feet below the top of dam. (See photographs #2, 3 & 10). Stoplogs are placed on the downstream side of the spillway at the outlet of an 18 inch metal pipe which carries flow directly below the spillway. The 18 inch pipe is used to facilitate lowering the lake below the spillway crest. This pipe is rusted at the outlet but is operative. The masonry walls are in reasonable condition considering the age of the structure. However, a vertical crack was observed in the north spillway wall running from the recently poured concrete toward the top of the spillway and appears to be approximately 1/2 inch in width. The crack is located in the key area where the stoplogs are placed and is believed to be caused by the settlement and readjustment of the masonry blocks.

d. Seepage

Extensive seepage was observed from 10 feet north of the spillway to 15 feet south of the spillway, exiting through the masonry blocks at the toe of the dam. No particulate migration was observed. The rate of flow was estimated to be 100 to 125 gallons per minute. (See photographs #6 & 7). Seepage is currently estimated by visual inspection.

A fluorescein dye was placed in the lake adjacent to the spillway. (See photograph #3). In approximately 2 minutes, evidence of the dye was observed near the downstream face north of the spillway and after 4.5 minutes, the dye was observed exiting from the south side of the spillway.

The cause of the seepage is believed to be related to seepage paths created in the masonry spillway walls which traverse the entire width of the dam, or in the settled backfill which pulled away from the spillway walls, since seepage and settlement is confined to the area surrounding the spillway. This seepage was first noted in the spring of 1978 when the downstream channel was cleaned of debris. The seepage could have been occurring for a considerable length of time prior to debris removal. No increase in quantity of flow has been reported since the initial discovery of the seepage. A grouting program has been scheduled to seal the seepage paths along the spillway walls. A bentonite seal on the upstream face is also proposed to reduce seepage flow until the grout has hardened.

It was reported that the area adjacent to the south spillway wall was excavated and backfilled with less pervious material in 1924 and 1964, after seepage was observed on the downstream face.

e. Regulating Outlets

An 18 inch metal pipe serves to augment the spillway capacity and is controlled by the spillway stoplogs. A 12 inch metal pipe located at the bottom of the dam below the spillway serves as a reservoir drain. The drain is controlled by a manually operated gate valve; the controls of which are located in the gate house above the spillway. (See photographs #1, 2 & 10).

f. Downstream Channel

The downstream channel is a natural stream bed. Little debris was observed in the channel.

g. Reservoir

No signs of instability or sedimentation were observed in the reservoir area.

3.2 EVALUATION OF OBSERVATIONS

Some deficiencies were observed and are considered to be of a minor nature. However, the observed seepage at the toe of the dam near the spillway is of prime importance and should be eliminated immediately to prevent the development of hazardous conditions.

SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURE

The Yankee Lake was previously used as a storage reservoir by the Delaware and Hudson Canal Company, but currently the lake is used for recreation purposes only. Stoplogs are used to control the reservoir level. Five 3" x 4" stoplogs are used during the spring and summer. During the fall and winter, all stoplogs are removed and the 12 inch reservoir drain is opened to minimize ice loading on the dam and aid in dock repair by the lake property owners.

4.2 MAINTENANCE OF THE DAM

There is no regular program of repair and maintenance and no operation and maintenance manual is available. The spillway channel and the walls were resurfaced with concrete up to a height of 2 feet from the channel bottom in 1978. Additional spillway repair and seepage control was undertaken in 1924, 1964 and 1967.

4.3 MAINTENANCE OF OPERATING FACILITIES

The reservoir drain and the spillway augmentation pipe are operational.

4.4 WARNING SYSTEM IN EFFECT

There is no warning system in effect or in preparation.

4.5 EVALUATION

The maintenance and operation of Yankee Lake Dam is considered adequate.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 DRAINAGE AREA CHARACTERISTICS

The Yankee Lake Dam is located on the Pine Kill, a tributary of the Bashert Kill and the Neversink River. The drainage area of the dam is 3.5 square miles. The topography is characterized by mild slopes interspersed with swamps.

5.2 ANALYSIS CRITERIA

For the purpose of this investigation, the design features were analyzed to determine the capacity of the spillway through the development of Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the PMF through the reservoir using HEC-1.

The unit hydrograph was defined by the Snyder Coefficients, T_p and C_p . The Probable Maximum Precipitation (PMP) was 21.0 inches (Figure 1), Hydrometeorological Report (HMR #33) for a 24 hour duration, 200 square mile basin. The percentages of the PMP applied to other duration storms were interpolated from the plot of drainage area versus percent of the 24 hour, 200 square mile depth (Figure 2, HMR #33). The PMF inflow hydrograph was determined by applying the PMP to the unit hydrograph for the basin and the peak inflow was 6,600 cfs. After routing the peak inflow through the impounded storage, the peak outflow was determined to be 300 cfs. Half of PMF peak inflow was 3,600 cfs and the routed peak outflow was 100 cfs.

5.3 SPILLWAY CAPACITY

The maximum head possible between the crest of the spillway and the top of the dam is 9.6 feet. The ungated stone masonry spillway is 3 feet wide at the crest of the spillway and extends 2 feet above the crest. The walls of the spillway are notched up to this level to accommodate stoplogs. However, 2 stoplogs were in place at the time of inspection. The spillway is 3.6 feet wide above this level.

The maximum computed capacity of the spillway without stoplogs is 400 cfs. This capacity will be reduced to 250 cfs with the use of the maximum number of stoplogs (i.e. 2 feet above spillway crest).

5.4 RESERVOIR CAPACITY

The reservoir capacity at spillway level is 2700 acre-feet and the capacity at the top of the dam is 7000 acre-feet. The storage capacity curve is shown in Appendix D. The curve indicates a surcharge storage above spillway crest of 4,300 acre-feet which is equivalent to a runoff depth of 23 inches (PMP = 21 inches) over the drainage area. The large reservoir storage is responsible for reducing the PMF peak inflow of 6,600 cfs to an outflow of only 300 cfs.

5.5 FLOODS OF RECORD

The highest water levels recorded since completion of Yankee Lake Dam are as follows:

| | Date | Elevation (feet) | Discharge (cfs) |
|---------|-------------|---------------------|--------------------|
| Highest | August 1955 | 1439.3 | 12 |
| Lowest | Unknown | | |

5.6 OVERTOPPING POTENTIAL

The capacity of the spillway is 400 cfs compared to a PMF outflow of 300 cfs. Since the reservoir can store the entire PMF, no overtopping potential exists.

5.7 EVALUATION

The storage capacity of the reservoir is adequate to retain the PMF with no discharge.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Seepage observed at the toe of the dam in the vicinity of the spillway is estimated to be 100 to 125 gallons per minute. The continuation of this seepage could lead to the development of hazardous conditions and immediate remedial action is required.

The following visual observations are indicative of distress within the earth embankment, and warrant continued observation at bi-monthly intervals: While the spillway appeared to be in good condition, settlement of the embankment portions has resulted. (See photographs #1, 2, 4 & 5). Some settlement of the crest was observed, the maximum being approximately 14 inches. A bulge located on the downstream face approximately 200 feet north of the spillway was evident.

b. Design and Construction Data

No design computations or other data regarding the structural stability of the spillway or earth embankment are available.

c. Operating Records

No records of operation are available and no significant operational problems were reported.

d. Post-Construction Changes

The dam and appurtenant structures were constructed about 1844. The earth core of the dam was repaired in 1924 and again in 1964 near the south wall of the spillway, to control seepage. About 1967, a concrete spillway was poured within the masonry walls to reduce spillway flow from seeping into the masonry abutment walls. In 1978, concrete spillway walls 2 feet high and each approximately 4 inches thick were constructed adjacent to the masonry spillway walls to further reduce the seepage potential. A grouting program is scheduled this construction season to control the aforementioned seepage.

e. Seismic Stability

The dam is located in Seismic Zone 1. Therefore a seismic analysis is not warranted.

SECTION 7: ASSESSMENT/RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

The Phase 1 inspection of Yankee Lake Dam did not indicate conditions which constitute an immediate hazard to human life or property. However, the excessive seepage observed at the toe of the dam near the spillway has a potential for development of hazardous conditions. Therefore, investigation and immediate remedial action is required.

b. Adequacy of Information

The information reviewed for the purposes of the Phase 1 inspection report is considered adequate.

c. Urgency

Control of the seepage in the vicinity of the spillway must be initiated immediately. A grouting program was underway during an inspection conducted on May 2, 1979. If this program is not successful, an engineering investigation and additional remedial measures must be instituted to control this seepage. The remaining deficiencies listed below require action which should be completed this construction season.

d. Need for Additional Investigation

An immediate investigation is required to determine the type and extent of remedial measures warranted to control the seepage observed in the vicinity of the spillway.

7.2 RECOMMENDED MEASURES

- a. Results of the aforementioned seepage investigation will determine the remedial measures required.
- b. Periodically and systematically monitor the conditions of observed settlement and movement in the vicinity of the spillway and on the downstream face.
- c. Remove the brush and trees observed along the toe of the dam and provide a periodic program of mowing and cutting.
- d. Initiate a program of periodic inspection and maintenance of the dam and appurtenances. Document this information for future reference and develop an operations manual.
- e. Develop a contingency plan for evacuation of downstream residents and notification of the proper authorities if movement or other hazardous conditions develop.

APPENDIX A

PHOTOGRAPHS



Photograph #2

Spillway viewed from Downstream Area

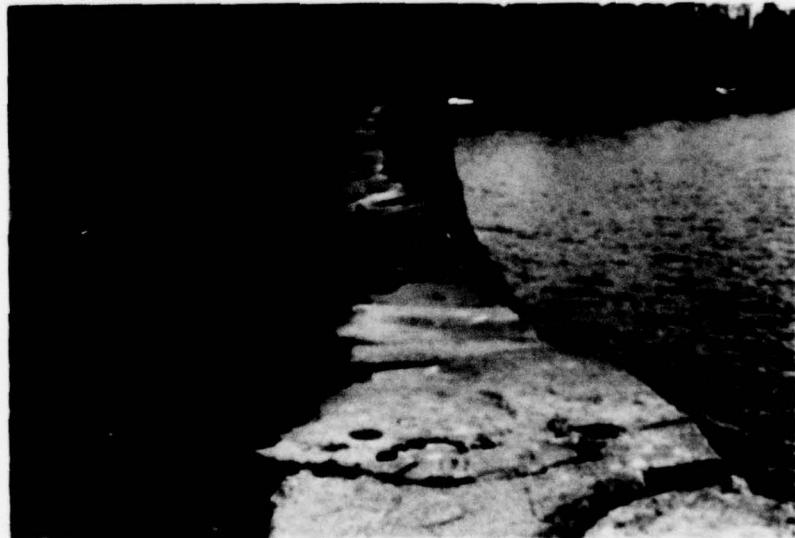


Photograph #3

Spillway, Upstream Face
Note dye in water left of Trash Rack



Photograph #4
Upstream Face, Looking South



Photograph #5
Upstream Face, Looking North



Photographs #6 A, B, & C

Area of Observed Seepage as
viewed from top of dam

Photographs #7 A, B & C
Area of Observed Seepage
viewed from Downstream Area



Photograph #9



Photograph #8



Downstream Face, looking North
Note: Bulge Area circled

Bulge Area on downstream Face
Looking South to Spillway

Photograph #10

Spillway channel viewed from inside dam looking downstream
Note: New concrete walls and stoplogs on platform



APPENDIX B

ENGINEERING DATA CHECKLIST

Check List
 Engineering Data
 Design Construction Operation

Name of Dam YANKEE CREEK DAM

I.D. # NY 222

| Item | Plans | Details | Typical Sections | Remarks |
|---|-------|---------|------------------|---------------------------|
| Dam | None | None | None | None other than a sketch. |
| Spillway(s) | None | None | None | |
| Outlet(s) | None | None | None | |
| Design Reports | None | None | None | |
| Design Computations | None | None | None | |
| Discharge Rating Curves | None | None | None | |
| Dam Stability | None | None | None | |
| Seepage Studies | None | None | None | |
| Subsurface and Materials Investigations | None | None | None | |

| Item | Remarks |
|---|--|
| Construction History | None other than what has been reported in section 1.2.g. |
| Surveys, Modifications, Post-Construction Engineering Studies and Reports | No reports available. See design and construction history section 1.2.g. |
| Accidents or Failure of Dam Description, Reports | None |
| Operation and Maintenance Records Operation Manual | None available |

APPENDIX C

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST1) Basic Data

a. General

Name of Dam YANKEE LAKEI.D. # NY 332Location: Town MAMAKATING County SULLIVANStream Name 80% FED BY 3 SMALL STREAMS THAT REMAIN DRY IN SUMMER AND
20% SPRING FED.Tributary of PINE KILLLongitude (W), Latitude (N) 74° 33' 08" / 41° 34' 46"Hazard Category CDate(s) of Inspection OCTOBER 2018/1978Weather Conditions 40°, CLOUDYb. Inspection Personnel BOB McCARTY, M ISLAM, DON PATTERSON,
DICK JEWETTc. Persons Contacted DON PATTERSON (717) 754-8635 225, 856-5128 BUS.
DICK JEWETT (717) 491-4635

d. History:

Date Constructed 1844Owner YANKEE LAKE CO., BOX 225, R.R. - 1, WURTSBORO, N.Y. 12790Designer DELAWARE AND HUDSON CANAL CO.Constructed by DELAWARE AND HUDSON CANAL CO.2) Technical DataType of Dam EARTH DAMDrainage Area 3.49 square milesHeight 22 FEET Length 1600 FEETUpstream Slope 60° ANGLE Downstream Slope VERTICAL

2) Technical Data (Cont'd.)

External Drains: on Downstream Face None @ Downstream Toe None

Internal Components:

Impervious Core None

Drains None

Cutoff Type None

Grout Curtain None

3) EmbankmentEarth core - 1600' long masonry faces

a. Crest

(1) Vertical Alignment good(2) Horizontal Alignment settlement in vicinity of spillway was present14" on N. side of spillway upstream face; downstream from 10-12" N. side of spillway(3) Surface Cracks none observed(4) Miscellaneous In 1924 & 1964 area south of spillway (earthcore) was excavated & backfilled for control seepage

b. Slopes

(1) Undesirable Growth or Debris, Animal Burrows None observed on
masonry slopes - small trees at & below toe of dam(2) Sloughing, Subsidence or Depressions subsidence of earth
embankment sections relative to spillway - see horizon align above
slight bulge 2-6" / approx 200 feet north of spillway on east. face(3) Slope Protection stone masonry construction - both faces(4) Surface Cracks or Movement at Toe none evident(5) Seepage excessive seepage 100-125 gpm evident at toe
of dam near spillway, seepage from 10 feet north to 15
feet south of spillway, no line migration, exiting thru masonry

(6) Condition Around Outlet Structure

good condition except for seepage noted above

c. Abutments

good condition

(1) Erosion at Embankment and Abutment Contact none evident

(2) Seepage along Contact of Embankment and Abutment none evident

(3) Seepage at toe or along downstream face soft wet areas

along toe, but could be from previous rain

d. Downstream Area - below embankment

(1) Subsidence, Depressions, etc. no problems observed

(2) Seepage, unusual growth numerous small trees

should be removed from toe to toe just west

(3) Evidence of surface movement beyond embankment toe none evident

(4) Miscellaneous none

e. Drainage System

none

(1) Condition of relief wells, drains, etc. _____

~~None~~

(2) Discharge from Drainage System _____

~~None~~

4) Instrumentation

(1) Monumentation/Surveys NONE

(2) Observation Wells NONE

(3) Weirs NONE

(4) Piezometers NONE

(5) Other -

5) Reservoir

a. Slopes O.K.

b. Sedimentation NONE REPORTED or observed

6) Spillway(s) (including tail race channel) (See sketch in section 4)

This is a ~~masonry and concrete~~ spillway 3 feet wide at the base and upto a height of 2 feet and 3 feet 7 $\frac{1}{2}$ inches above it.

a. General There has been some settlement of the dam (about 1 foot) around the spillway. Extensive seepage (about 1000 gpm) was observed on both side of spillway. In general, the embankment ~~area~~ around the spillway is in poor condition and needs immediate attention.

b. Principle Spillway The spillway channel and the walls upto a height of 2 feet have been resurfaced with cement concrete. Above this level the stone masonry wall is in fairly good condition excepting a few vertical cracks on the north wall. Some calcification was observed on the walls of the spillway. The concrete slab that covers the top of the spillway is in good condition.

c. Emergency or Auxiliary Spillway _____

None

d. Condition of Tail race channel The tailrace channel is a very shallow channel. In addition this channel is full of debris - such as planks, tree branches, misplaced riprap etc.

e. Stability of Channel side/slopes The channel is very shallow hence no stability Problem is anticipated

7) Downstream Channel

_____ This channel, as far as visible, ~~was~~ is very shallow.

a. Condition (debris, etc.) There were many trees in the channel.

In addition, blanks, tree branches and other debris were interrupting the flow in the channel.

b. Slopes No problem since the channel is very shallow.

c. Approximate number of homes There are more than 100 homes below the dam (between dam and 5 miles downstream).

8) Miscellaneous At least 75 homes will be flooded, if the dam fails (source: caretaker).

Seepage at toe of spillway is probably due to settling & readjustment of backfill (earth core) adjacent to spillway. Deterioration of masonry walls could also contribute to this problem.

g) Structural

a. Concrete Surfaces spillway walls recently poured (1978 - October)good conditionb. Structural Cracking none evident in concretestepleg notch on north side of spillway - observed1/2" wide crack - no evidence of movement from crack wasreflected in recently poured concrete

c. Movement - Horizontal & Vertical Alignment (Settlement)

none evident in spillway sectionmovement evident on upstream & downstream masonry facessee #3 Embankment

d. Junctions with Abutments or Embankments

n/a

e. Drains - Foundation, Joint, Face

none

f. Water passages, conduits, sluices

operational

g. Seepage or Leakage

seepage at toe of masonry wallsnear spillway see #3 Embankment

- h. Joints - Construction, etc. _____
no problems observed
- i. Foundation _____ suitable - of embankment portions
relative to light (weight-wise) spillover section
max. moment 14"
this moment is not current, it was reported to be
about the same condition for the past 25 years +
- j. Abutments _____ n/a
- k. Control Gates _____ operational
- l. Approach & Outlet Channels _____ some debris & trees in
outlet channel not a major problem
since spillover discharge is limited
- m. Energy Dissipitators (plunge pool, etc.) _____
none
- n. Intake Structures _____
none
- o. Stability _____ appears good
- p. Miscellaneous _____

APPENDIX D
HYDROLOGIC/HYDRAULIC
ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

1

AREA-CAPACITY DATA:

| | Elevation (ft.) | Surface Area (acres) | Storage Capacity (acre-ft.) |
|--|--------------------|-------------------------|--------------------------------|
| 1) Top of Dam | 1447.8 | 0.65 | 6950 |
| 2) Design High Water (Max. Design Pool) | - | | |
| 3) Auxiliary Spillway Crest | - | | |
| 4) Pool Level with Flashboards | | | |
| 5) Service Spillway Crest | 1438 | 0.64 | 2700 |

DISCHARGES

| | Volume (cfs) |
|---|-----------------|
| 1) Average Daily | Unknown |
| 2) Spillway @ Maximum High Water | 400 |
| 3) Spillway @ Design High Water | - |
| 4) Spillway @ Auxiliary Spillway Crest Elevation | - |
| 5) Low Level Outlet | 30 |
| 6) Total (of all facilities) @ Maximum High Water | 450 |
| 7) Maximum Known Flood | 12 |

CREST: DAM

ELEVATION: 1448'3

Type: Earth dam with face walls (stone masonry)

Width: 34' near spillway - tapers to 26' Length: 1600 feet.

Spillover Concrete and masonry straight waterstop spillway

Location At about middle of the dam

SPILLWAY:

PRINCIPAL

EMERGENCY

1438'0

Elevation

None

Concrete and masonry
straight waterstop spillway

Type

3' from base to 2'; 3'-7 $\frac{1}{2}$ ' above

Width

Type of Control

Uncontrolled

Controlled:

Stoplogs

Type

(Flashboards; gate)

2 at the time of inspection

Number

Size/Length

Invert Material

Anticipated Length
of operating service

Chute Length

10 feet

Height Between Spillway Crest
& Approach Channel Invert
(Weir Flow)

OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES:

Type: Gate _____ Sluice _____ Conduit Penstock _____
Shape: Circular metal pipe
Size: 12 inches
Elevations: Entrance Invert _____ ←
Exit Invert 1426.0
Tailrace Channel: Elevation 1425.0

HYDROMETEROLOGICAL GAGES:

Type : None
Location: _____
Records:
Date - _____
Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (mechanisms):

None

DRAINAGE AREA: 3.49 sq. miles.

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: woods

Terrain - Relief: mild slopes

Surface - Soil: _____

Runoff Potential (existing or planned extensive alterations to existing
(surface or subsurface conditions)

NONE

Potential Sedimentation problem areas (natural or man-made; present or future)

NONE

Potential Backwater problem areas for levels at maximum storage capacity
including surcharge storage:

NONE

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the
Reservoir perimeter:

Location: NONE

Elevation: _____

Reservoir:

Length @ Maximum Pool 1.21 (Miles)

Length of Shoreline (@ Spillway Crest) 4.55 (Miles)

YANKEE LAKE
STORAGE

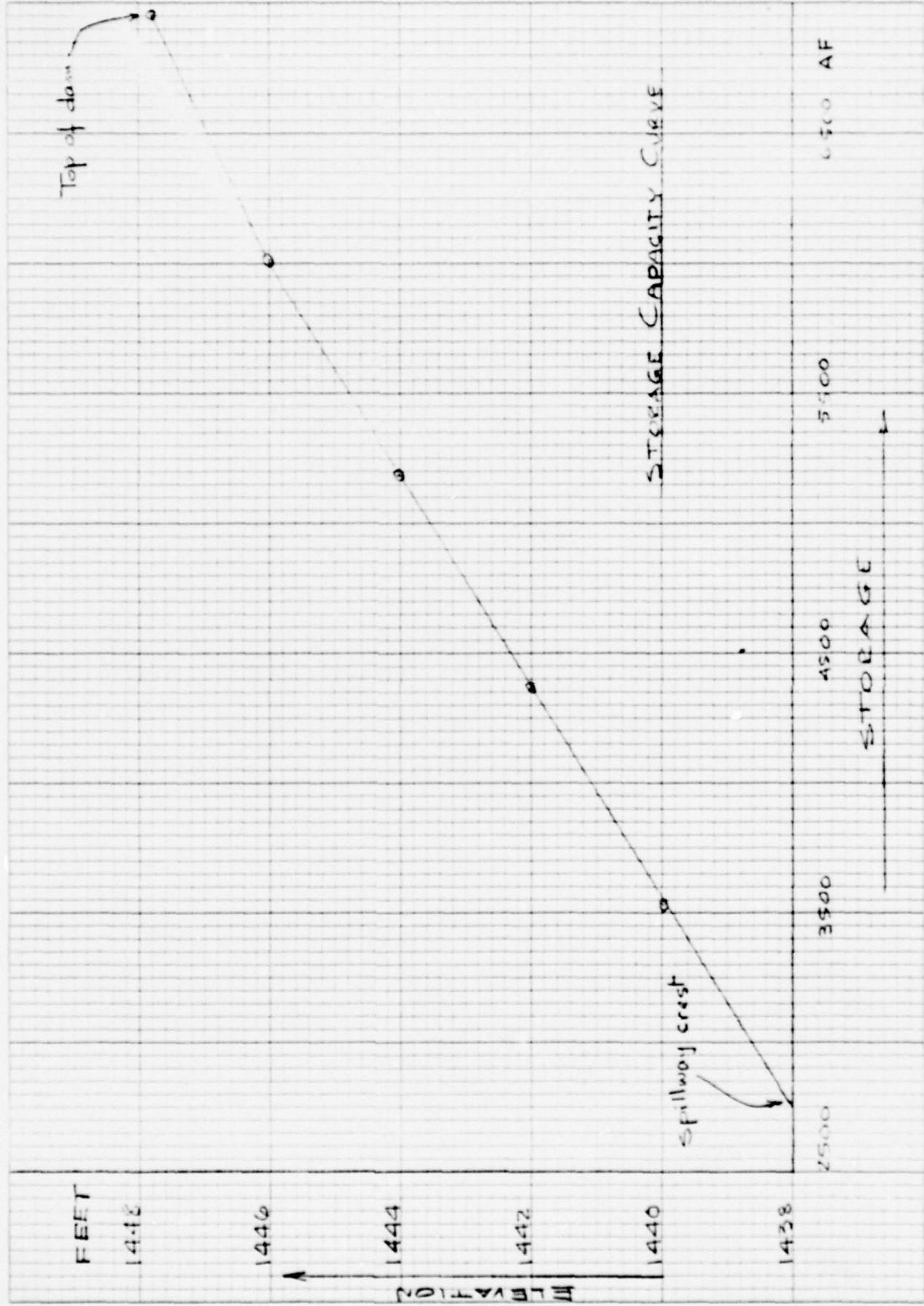
| Elevation, ft. | Lake Area, acres | Storage, acre-feet |
|----------------|------------------|--------------------|
| 1438 | 408 | 2720 |
| 1440 | 409.4 | 3537 |
| 1442 | 410.7 | 4357 |
| 1444 | 412.1 | 5180 |
| 1446 | 413.5 | 6006 |
| 1447.8 | 415.1 | 6959 |

All storage figures approximate.

Lake elevation at spillway level 1438 was
pickup from USGS Quad. sheet, Yankee Lake.

KoE TO THE INC. / 8. 10. 1952
KARREL & LUDEN CO. WISCONSIN

46 0700



SPILLWAY RATING CURVE

For Rectangular Channel

$$C = 3.235 + \frac{1}{60H - .56} + .428 \frac{H}{P}$$

$$Q = CLH^{3/2}$$

where C = Coefficient of discharge

H = Head over spillway

P = Height of spillway (upstream)

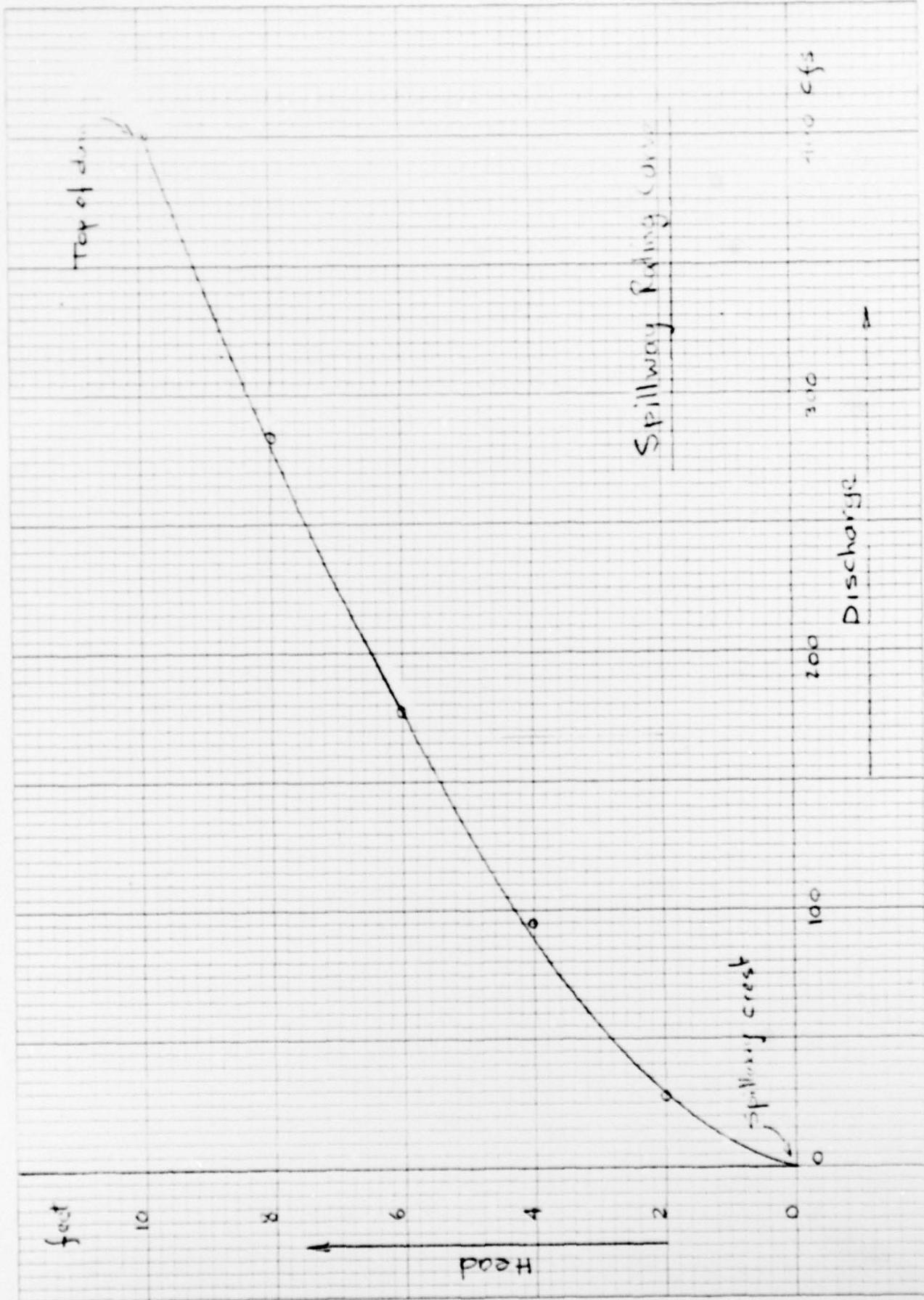
Q = Discharge over spillway

L = Length of spillway.

| H in feet | P in feet | C | L in feet | Q in cfs. |
|-------------|-------------|------|-------------|-------------|
| 2 | 10 | 3.33 | 3.0 | 28 |
| 4 | 10 | 3.41 | 3.5 | 95 |
| 6 | 10 | 3.50 | 3.5 | 180 |
| 8 | 10 | 3.58 | 3.5 | 284 |
| 9.8 | 10 | 3.67 | 3.5 | 400 |

KLE TO THE INCHES / A NO CREDITS

46 0700



YANKEE LAKEDAMTHIS PAGE IS BEST QUALITY PRACTICABLE
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D.A. = Drainage area in square miles

L = River mileage from the given station to the upstream limit of the drainage area

LCA = River mileage from the station to the center of gravity of the drainage area

PMP = Probable Maximum Precipitation in inches

tp = Lag time from mid-point of unit rainfall duration, tr, to peak of unit hydrograph, in hours.

tr = Unit rainfall duration, equal to $\frac{tp}{550}$, in hours.

Ct = Coefficient depending upon units and drainage basin characteristics

t2 = Unit rainfall duration other than standard unit;
tr, adopted in specific study, in hours.tp_{re} = lag time from mid-point of unit rainfall duration
t2, to peak of unit hydrograph, in hours

D.A. = 3.49 square miles, L = 2.42 miles, LCA = 0.84 miles

PMP = inches Ct = 2,

Cp = 0.625 from average 640 Cp = 400

$$tp = Ct (L \cdot LCA)^{0.3} = 2(2.42 \times 0.84)^{0.3} = 2.47 \text{ hours}$$

$$tr = \frac{tp}{5.5} = \frac{2.47}{5.5} = 0.45 \text{ hours (use 1 hr. hydrograph)}$$

$$tp_{re} = tp + 0.25(t_2 - tr) = 2.47 + 0.25(1 - 0.45) = 2.61 \text{ hrs.}$$

From HMR 33 - Figure 2 Depth-Area-Duration

6 hour % 111 = , 12 hour % = 123

24 hour % 133 = , 48 hour % = 142

REC-1 VERSION DATED JAN 1973
UPDATED AUG 74
CHAVIE L.D., OI

YAKKE LAKE DAM
RESERVOIR ROUTING OF PAF
STRAIGHT INLET CROP SPILLWAY

| J110 SPECIFICATION | | | | | | |
|--------------------|------|------|-----|------|-------|------|
| NR | NMIN | IDAY | IHR | IMIN | METAC | IPLT |
| 100 | 1 | 0 | 0 | 0 | 0 | 0 |
| | | | | | JUPER | 1147 |
| | | | | | 5 | 0 |

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLATE 1 HRTIO= 2 LRTIO= 1

MODERNISATION AND CIVILISATION

UNIT HYDROGRAPH DATA
TP = 2.61 CP=0.63 NTA = 0

RECSSION DATA
STFTQ = 6.93 QCSN = 6.98 RTUR = 1.00
GIVEN SLOOER CP AND TP ARE TC = 2.91 AND R = 2.38 INTERV

APPROXIMATE CROWN COEFFICIENTS FROM

END-OFF-PERIOD FLOW
TIME RAIN EXCS COMP Q

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| | | |
|----|------|-------|
| 9 | 0.02 | 7. |
| 10 | 0.02 | 7. |
| 11 | 0.02 | 7. |
| 12 | 0.02 | 7. |
| 13 | 0.12 | 7. |
| 14 | 0.14 | 7. |
| 15 | 0.14 | 7. |
| 16 | 0.45 | 13. |
| 17 | 0.17 | 0.07 |
| 18 | 0.13 | 0.03 |
| 19 | 0.01 | 78. |
| 20 | 0.01 | 68. |
| 21 | 0.01 | 50. |
| 22 | 0.01 | 35. |
| 23 | 0.01 | 25. |
| 24 | 0.01 | 19. |
| 25 | 0.14 | 16. |
| 26 | 0.11 | 0.01 |
| 27 | 0.11 | 0.01 |
| 28 | 0.11 | 0.01 |
| 29 | 0.11 | 0.01 |
| 30 | 0.11 | 0.01 |
| 31 | 0.32 | 20. |
| 32 | 0.32 | 44. |
| 33 | 0.32 | 0.22 |
| 34 | 0.32 | 122. |
| 35 | 0.32 | 0.22 |
| 36 | 0.32 | 232. |
| 37 | 1.77 | 0.22 |
| 38 | 2.12 | 325. |
| 39 | 2.65 | 0.22 |
| 40 | 6.72 | 386. |
| 41 | 2.48 | 425. |
| 42 | 1.95 | 0.13. |
| 43 | 0.16 | 0.01 |
| 44 | 0.16 | 0.01 |
| 45 | 0.15 | 0.01 |
| 46 | 0.16 | 0.01 |
| 47 | 0.16 | 0.01 |
| 48 | 0. | 0.01 |
| 49 | 0. | 0.01 |
| 50 | 0. | 0.01 |
| 51 | 0. | 0.01 |
| 52 | 0. | 0.01 |
| 53 | 0. | 0.01 |
| 54 | 0. | 0.01 |
| 55 | 0. | 0.01 |
| 56 | 0. | 0.01 |
| 57 | 0. | 0.01 |
| 58 | 0. | 0.01 |
| 59 | 0. | 0.01 |
| 60 | 0. | 0.01 |
| 61 | 0. | 0.01 |
| 62 | 0. | 0.01 |
| 63 | 0. | 0.01 |
| 64 | 0. | 0.01 |
| 65 | 0. | 0.01 |
| 66 | 0. | 0.01 |

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| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|-------|--------|---------|---------|--------|--------|
| 65dB. | 49.9. | 1760. | 598. | 43217. | 43217. |
| | 13.32 | 18.76 | 14.11 | | 19.20 |
| | 24d0. | 3493. | 3557. | | 3573. |

| CFS | INCHES | AC-FT |
|-------|--------|-------|
| 3. | 3. | |
| 3. | 10. | |
| 25. | 61. | |
| 22. | 3294. | |
| 2746. | 106. | |
| 164. | 4. | |
| 4. | 3. | |
| 3. | 3. | |
| | | 2. |

HYDROGRAPH AT STA 1 FOR PLAN 1, RATIO 1

| PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|-------|--------|---------|---------|--------|--------|
| 3294. | 250. | 880. | 299. | 21608. | 9.60 |

| | | |
|---------|-------|---|
| CFS | 7. | 6 |
| INC/IFS | 7. | |
| AC=FT | 35. | |
| | 122. | |
| | 6583. | |
| | 211. | |
| | 7. | |

| | 2/22. | 2/23. | 2/24. | 2/25. | 2/26. |
|--------|-------|-------|-------|-------|-------|
| 2/52. | 2712. | 2711. | 2814. | 2043. | 2876. |
| 2/70. | 2712. | 2711. | 2814. | 2043. | 2918. |
| 2/91. | 4232. | 4753. | 5192. | 5511. | 5722. |
| 3/751. | 4232. | 4753. | 5192. | 5511. | 5961. |
| 6/124. | 6122. | 5014. | 5440. | 5791. | 5936. |
| 5/553. | 5134. | 5011. | 5730. | 5770. | 5856. |
| 3/651. | 5632. | 5613. | 5294. | 5576. | 5729. |
| 5/651. | 5632. | 5613. | 5294. | 5576. | 5749. |
| 5/669. | 5434. | 5417. | 5417. | 5401. | 5557. |
| 5/304. | 5259. | 5273. | 5258. | 5243. | 5684. |

| | PEAK | 6-HOUR | 24-HOUR | 72-HOUR | TOTAL | VOLUME |
|--------|------|--------|---------|---------|---------|--------|
| CFS | 287. | 2.85. | 2.65. | 1.89. | 1.3659. | |
| INCHES | | 0.76 | 2.86 | 6.06 | 6.07 | |
| AC-FT | | 141. | 532. | 1126. | 1129. | |

PEAK FLOW SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

| OPERATION | STATION | PLAN | RATIOS APPLIED TO FLOWS | |
|---------------|---------|------|-------------------------|-------|
| | | | 0.50 | 1.00 |
| HYDROGRAPH AT | 1 | 1 | 3274. | 6588. |
| | 2 | 2 | 0. | 0. |
| ROUTED TO | 1 | 1 | 100. | 287. |
| | 2 | 2 | 0. | 0. |

LIST OF REFERENCES

APPENDIX E

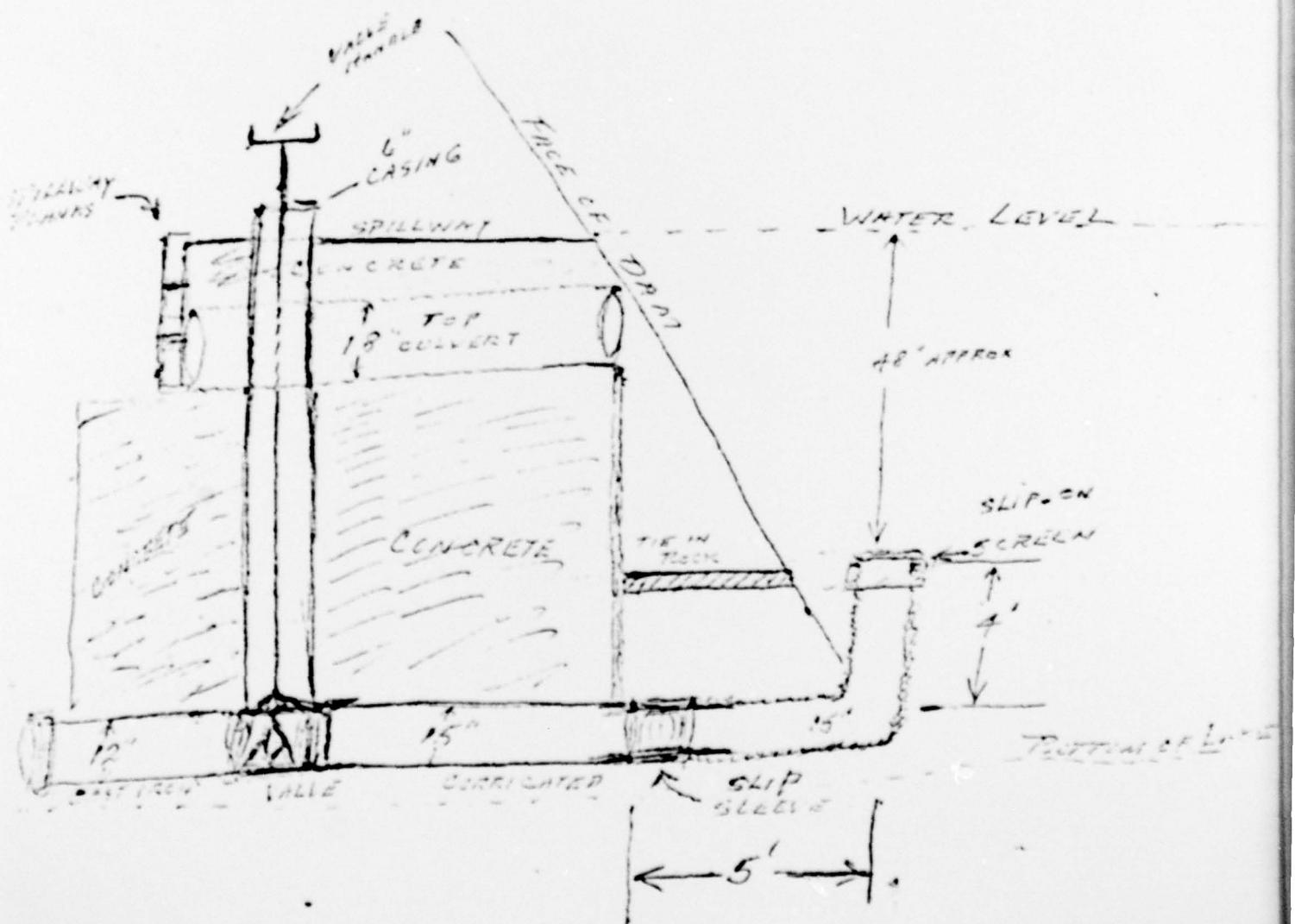
APPENDIX E

REFERENCES

- 1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.
- 2) Soil Conservation Service, National Engineering Handbook, Section 4, Hydrology, August 1972 (U.S. Department of Agriculture).
- 3) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.
- 4) T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley and Sons, 1965.
- 5) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.
- 6) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.
- 7) Cornell University Agriculture Experiment Station (compiled by M.G. Cline and R.L. Marshall), General Soil Map of New York State and Soils of New York Landscapes, Information Bulletin 119, 1977.

APPENDIX F

DRAWINGS



CULVERT SIDE VIEW
NOV 23 1971

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233



Peter A. A. Berle,
Commissioner

October 23, 1978

Mr. J. David Schardien, Secretary/Treasurer
Yankee Lake Company, Inc.
R.R. 1 - Box 225
Wurtsboro, New York 12790

Dear Sir:

On October 20, 1978 our staff inspected your dam with the aid of Messers Richard Jewett and Donald Patterson, representatives of your company. During this inspection, evidence of excessive seepage was observed flowing at the base of the dam near the toe of the downstream face approximately 10 feet north of the spillway. No particulate migration was observed at the exit point. However, dye placed near the spillway on the upstream face, traversed the dam and appeared downstream in approximately 5 minutes. The seepage observed was first noticed this spring and is estimated to be in excess of 100 gallons per minute.

The grouting program, which you have scheduled in approximately 2 weeks, is similar to the seepage problems and successful rehabilitation of Wanaksink Dam. We believe that a well engineered grouting program will control this seepage. You are requested to complete this work as soon as possible so that the safety of the dam is maintained. In the interim, we also request that all draw-down facilities (valves etc.) remain immediately and continuously open, at least until completion of the grouting work. At this time, the dam will be reinspected and if the seepage has been properly controlled, the draw-down facilities may be returned to their normal operating condition. These requests have been discussed with Messers Jewett and Patterson via telephone this date and it was learned that drawdown facilities are open.

In addition, daily observation of the seepage condition should commence as soon as possible and continue until the completion of the grouting program. Any changes in quantity of seepage or color of flow, should be reported immediately.

Mr. J. David Schardien
Page 2
October 23, 1978

Please contact this office at (518) 457-1216, as soon as the grouting program commences so that we may observe this work and be assured of its adequacy.

Thank you for your cooperation.

Very truly yours,

Robert P. McCarty
Senior Civil Engineer
Dam Safety Section

RPM; dr

cc: Mr. A. Barbero
Mr. A. Spina